Solutions

---

1. Find sin θ, cos θ, and tan θ for each triangle, expressed as fractions in lowest terms.
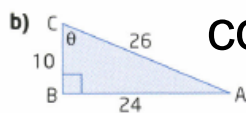
SOHCAHTOA

$\sin(θ) = opp/hyp$
$\cos(θ) = adj/hyp$
$\tan(θ) = opp/adj$

b)

$\sin(θ) = 24/26 = 12/13$

$\cos(θ) = 10/26 = 5/13$

$\tan(θ) = 24/10 = 12/5$

d)

$\sin(θ) = 8.9/12 = 89/120$

$\cos(θ) = 8/12 = 2/3$

$\tan(θ) = 8.9/8 = 89/80$

f)

$\sin(θ) = 2/5.4 = 10/27$

$\cos(θ) = 5/5.4 = 25/27$

$\tan(θ) = 2/5$

h)

$\sin(θ) = 11/17$

$\cos(θ) = 13/17$

$\tan(θ) = 11/13$
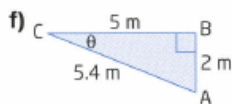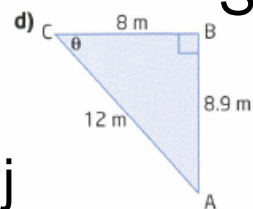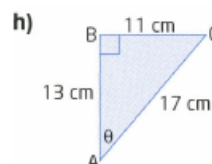
SOHCAHTOA

2. Find the three primary trigonometric ratios for ∠A, to four decimal places.
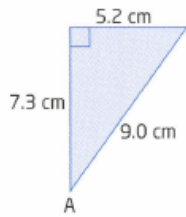
a)

5.2 cm

7.3 cm

9.0 cm

A

sin(A) = 5.2/9
= 0.5778

cos(A) = 7.3/9
= 0.8111

tan(A) = 5.2/7.3
= 0.7123

sin(θ) = opp/hyp

c)

B　9 cm　C

7 cm

11.4 cm

A

sin(A) = 9/11.4
= 0.7895

cos(A) = 7/11.4
= 0.6140

tan(A) = 9/7
= 1.2857

cos(θ) = adj/hyp

e)

A

10 cm　14.9 cm

B　11 cm　C

sin(A) = 11/14.9
= 0.7383

cos(A) = 10/14.9
= 0.6711

tan(A) = 11/10
= 1.1000

tan(θ) = opp/adj

---
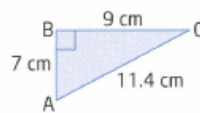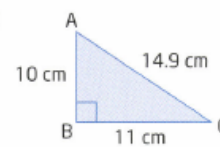
4. Evaluate each of the following with a calculator, rounded to four decimal places.

b) cos 45°

d) cos 60°

f) cos 0°

h) cos 83°

b) 0.7071

d) 0.5000

f) 1.0000

h) 0.1219

Recall:

Not all scientific calculators work the same way. With some, you press

[TAN] **25** [=]

With others, you press

25 [TAN]

On a graphing calculator, press

[TAN] **25** [ )] [=]

Make sure your calculator is in degree mode.

Obviously, TAN could be SIN or COS depending upon the information given in the question.

7. Find the measure of each angle, to the nearest degree.
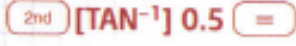
b) $\cos A = 0.6329$ b) A = 51°

d) $\cos \theta = 0.3432$ d) θ = 70°

f) $\cos M = \dfrac{3}{14}$ f) M = 78°

h) $\cos \theta = 0.6215$ h) θ = 52°

j) $\cos X = 0.0193$ j) X = 89°

l) $\cos J = \dfrac{1}{2}$ l) J = 60°

Recall: With some scientific calculators, you press

2nd [TAN⁻¹] 0.5 =

With others, you press

0.5 2nd [TAN⁻¹]

Obviously, TAN could be SIN or COS depending upon the information given in the question.

---

11. Find the length of x, to the nearest tenth of a unit, by applying the cosine ratio.
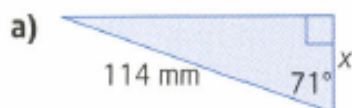
$\cos(\theta) = adj/hyp$

a)
114 mm   71°   x
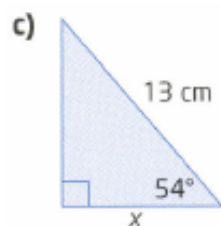
a) cos(71) = x/114
   114cos(71) = x
   37.1 mm = x

c) cos(54) = x/13
   13cos(54) = x
   7.6 cm = x

c)
13 cm   54°   x

e)
12 cm   47°   x

e) cos(47) = x/12
   12cos(47) = x
   8.2 cm = x

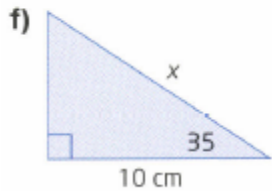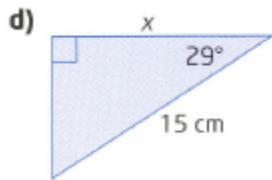g) cos(18) = 6/x
   xcos(18) = 6
   x = 6/cos(18)
   x = 6.3 cm

g)
6 cm   18°   x

11. Find the length of x, to the nearest tenth of a unit, by applying the cosine ratio.
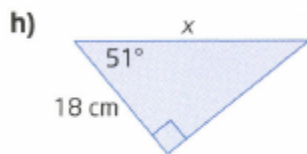
$$\cos(\theta) = adj/hyp$$

b)

d)

f)

h)
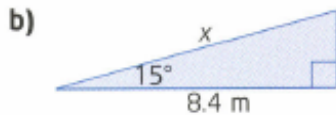
b) $\cos(15) = 8.4/x$

$x\cos(15) = 8.4$

$x = 8.4/\cos(15)$

$x = 8.7$ cm

d) $\cos(29) = x/15$

$15\cos(29) = x$

13.1 cm $= x$

f) $\cos(35) = 10/x$

$x\cos(35) = 10$

$x = 10/\cos(35)$

$x = 12.2$ cm

h) $\cos(51) = 18/x$
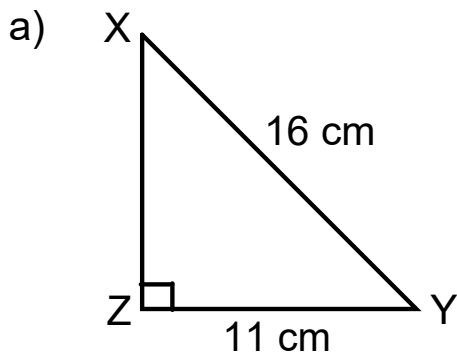
$x\cos(51) = 18$

$x = 18/\cos(51)$

$x = 28.6$ cm

14. In $\triangle XYZ$,
$XY = 16$ cm
$YZ = 11$ cm
$\angle Z = 90°$

a) Draw this triangle and label the given information.

b) Solve $\triangle XYZ$.

b) Solving a triangle means to find all the missing information.

$$\cos(\theta) = adj/hyp$$

a)

$\cos(Y) = 11/16$

$Y = \cos^{-1}(11/16)$

$Y = 47°$
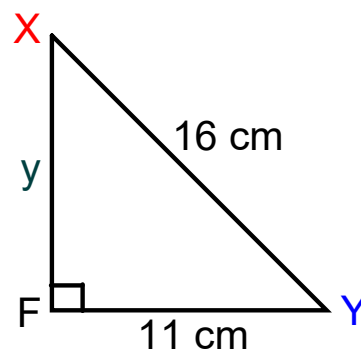
$\angle X = 180 - 90 - 47$

$\angle X = 43°$

$\cos(43) = y/16$

$16\cos(43) = y$

11.7 cm $= y$

Note: If you use the Pythagorean theorem to solve for y then you will get 11.6 cm as your answer.

4

23. The hypotenuse of a right triangle is 10 m long. How long is the side adjacent to the 21° angle, to the nearest tenth of a metre?
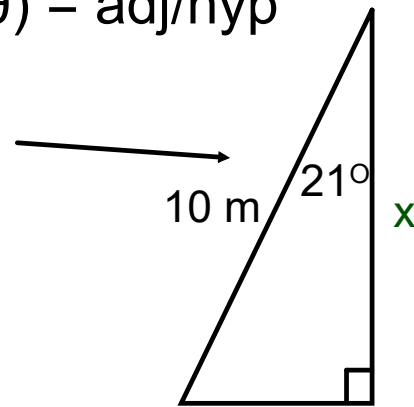
$$\cos(\theta) = adj/hyp$$

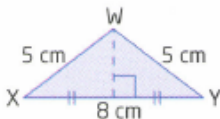Draw a sketch to help you

10 m   21°   x

$\cos(21) = x/10$

$10\cos(21) = x$

$9.3\ m = x$

The side adjacent side to the 21° angle is 9.3 metres long.

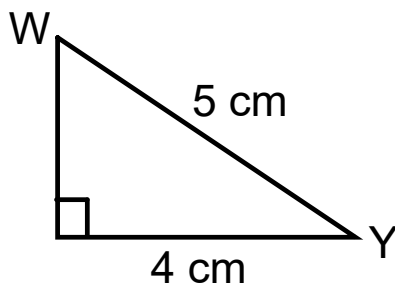**25.** Find all the angles in △WXY, to the nearest degree.

$$\cos(\theta) = adj/hyp$$

W

5 cm   5 cm

X   8 cm   Y

The triangle is isosceles because WX = WY.

Therefore <X = <Y.

Length XY is split in half by the perpendicular line from W dropping down to the base.

W

5 cm

4 cm   Y

$\cos(Y) = 4/5$

$Y = \cos^{-1}(4/5)$

$Y = 37°$

Therefore <X = 37° and

<W = 180 - 37 - 37

= 106°

The three answers are <X = 37°, <Y = 37°, and <W = 106°.